

Syllabus

Autumn 2021: PPHA 31002 Statistics for Data Analysis I

Dr. Eyal Frank
eyalfrank@uchicago.edu

Dr. Sheng-Hao Lo
shenghaolo@uchicago.edu

Dr. Daniel Moskowitz
dmoskowitz@uchicago.edu

Course Overview:

This is the first quarter of the statistics sequence at the Harris School. This course aims to provide students with a basic understanding of statistical analysis for policy research. We recognize that Harris students come from a variety of academic backgrounds and real-world experiences. This course makes no assumptions about prior knowledge of statistics or data science, apart from basic mathematics and coding skills introduced in Math Camp. Students with more advanced backgrounds in statistics or econometrics may wish to instead consider PPHA 31202, Advanced Statistics for Data Analysis I.

Course Objectives:

- Become an adept and responsible consumer of quantitative data analysis.
- Understand how to *do* basic quantitative analysis in your own policy research.

To achieve these goals, we are going to help you develop rigorous statistical thinking and quantitative reasoning skills that will allow you to make appropriate inferences from data. We will develop a powerful toolkit for conducting quantitative analysis, and that toolkit is going to serve as a foundation for even more sophisticated tools that you will build upon in Stats II and your other Harris courses.

Health & Safety Considerations:

We are all members of the same community of learning, and we derive considerable benefits from our interactions with one another inside the classroom. However, in the context of an ongoing pandemic, our interactions with one another are not without risk. To mitigate this risk, students are expected to abide by all requirements in [UChicago's Health Pact](#), including always wearing a mask in the classroom regardless of vaccination status, self-monitoring for symptoms, and self-isolating when required to do so.

Course Format & Materials:

Due to the ongoing pandemic, course instruction will be conducted through a multi-mode format. Instruction will be provided primarily through both pre-recorded lectures as well as instructor-led live weekly sessions. Some of the instructor-led live session sections will take place in-person at the Keller Center, while other sections of the live session will take place in a virtual Zoom classroom. The content will be the same in the in-person and virtual live sessions.

We understand that the current circumstances of the pandemic are emotionally and physically taxing and represent a large time burden for many students. As a result, we have tried our best to structure the course to allow students flexibility in when and how they receive their course instruction. Thus, much of the content is provided in the form of pre-recorded lectures that you can watch at your convenience (so long as you keep up with the course schedule). At the same time, we also want to ensure that students have the opportunity to have an interactive learning experience, so we also have live weekly sessions with smaller sections of students (at least one session will also be recorded and posted online for students unable to attend their section). We hope that this model will achieve a balance of allowing students flexibility in their schedules and opportunities to interact with their instructor and classmates.

Specifically, each week students should attend, view, or read the following:

- (1) A **pre-recorded lecture** for the week posted to Canvas. Each week’s lecture will be broken up into multiple mini lectures to make the content more digestible. These lectures—along with the accompanying slides, which will also be posted to Canvas—will be the main resource for completing assignments and studying for assessments.
- (2) A weekly **interactive session** with your instructor and a group of students. You are expected to come prepared by watching the pre-recorded lecture for the week. *Note: in order to ensure a high-quality and safe experience compliant with public health rules, you are only permitted to attend the section to which you are assigned unless you have written permission from your instructor to attend a different section.* These interactive sessions will serve a variety of purposes, including reviewing some of the more difficult content from the asynchronous, pre-recorded lectures, demonstrating statistical concepts through practice problems, R tutorials to teach important coding concepts, and, of course, ample time for questions.
- (3) A weekly **recitation with a teaching assistant**. In these recitations, TAs provide instruction that is helpful in providing you with the coding and conceptual knowledge required to complete homework assignments. Recitations also provide you with another opportunity to ask questions about the material. *Note: as with the interactive session with your instructor, you may only attend the recitation section to which you are assigned.*
- (4) A **strongly recommended weekly reading assignment**. For most weeks, we will post a recommended reading to Canvas, as many students learn better with reading material that accompanies the lecture. While these reading assignments are not per se required, they are strongly recommended, especially for any student who is not exceling in the course. In addition to the strongly recommended readings posted to Canvas, we also provide supplemental reading suggestions from two textbooks: David Salsburg, *The Lady Tasting Tea* and Charles Wheelan, *Naked Statistics: Stripping the Dread from Data*. These resources can be very useful for any topics for which you think you need additional practice. We will provide a suggested reading list by topic for the supplemental textbooks on Canvas.

The course is divided into eight units:

- (1) Introduction
- (2) Probability Theory
- (3) Random Variables
- (4) Summary Statistics & Exploratory Data Analysis
- (5) Hypothesis Testing
- (6) Regression for Prediction and Description
- (7) Simulations
- (8) Experiments

Course Assignments & Assessment:

The composition of your overall grade is as follows:

Four Homework Assignments	56%
Weekly Mini-Assignments	5%
Two Mid-Quarter Quizzes	4%
Final Exam	35%

(Tentative) Assignment/Assessment Schedule:

Homework #1	10/15
Quiz #1	10/22
Homework #2	10/29
Homework #3	11/12
Quiz #2	11/19
Homework #4	12/3
Final Exam	TBD
Mini-Assignments	Weekly

*The above dates indicate the date of an exam/quiz or the due date of a homework assignment.

Homework Assignments:

There are four homework assignments due throughout the quarter. Each assignment is worth on average 14% of your overall grade. However, to reward your best work and minimize the consequences of a single bad assignment, the assignment with your highest score will be up-weighted to 17% of your overall grade and the assignment with your lowest score will be down-weighted to 11% of your overall grade.

All assignments should be submitted through Canvas in PDF format by 11:59pm on the stated due date. These assignments should be formatted in a clean and professional way; graders are not expected to sift through a disorganized writeup to find your answers. *Note: the answers that you upload to Canvas will be the answers that are graded.* You are responsible for ensuring that you have uploaded the most up-to-date and most complete file.

We will be using Gradescope to manage assignments and grading this quarter. You can find the Gradescope shortcut on the left side of your Canvas menu. **You must submit a PDF version of your assignment at that link, and NOT under “Assignments” on Canvas.** We will not consider submissions if they are not on Gradescope. In order to include your coding work in the PDF, you can use one of the three options listed below:

- 1) Save your .R file as a PDF and attach it to your homework PDF with the rest of your assignment
- 2) Take screenshots of your .R file and copy them into your homework PDF with the rest of your assignment. Make sure it's legible if you use this option.
- 3) If you are so inclined, use R Markdown to knit your code + rest of your assignment together into a PDF

A late assignment will be penalized by a 20% grade reduction if it is submitted within 24 hours of the due date/time, and an assignment submitted 24-48 hours after the due date/time will be penalized by a 40% grade reduction. Assignments will not be accepted more than 48 hours after the due date/time. *For the final assignment (HW4), late submissions will not be accepted.* We plan to release the HW4 solutions soon after the due date/time to allow students to prepare for the final exam. Late submissions for this assignment will receive a score of 0.

The collaboration policy will be clearly stated on each assignment. Your work should only reflect your knowledge and your effort. That means, for instance, that your writeup to an assignment should always and entirely be written in your own words. On occasion, there might be parts of an assignment in which collaboration is *not* permitted. The assignment instructions will clearly state when this is the case. You must work on your own for these parts of the assignment. If you are ever unsure about what is permissible, proper attribution, and other academic (dis)honesty issues, please ask the teaching staff!

Weekly Mini-Assignments:

Each week we will provide a very short assignment that demonstrates concepts from the course in R. These are generally self-guided coding tutorials. Mini-assignments are due by 6:59am CT on Wednesdays and *graded based on completion.*

Quizzes:

We will also administer two quizzes about one-third and two-thirds of the way through the quarter. The quizzes are short exams and provide you with a sense of the degree to which you are grasping the course material. Each quiz is only worth on average 2% of your overall grade (your lowest quiz score is worth 1% of your overall grade and your highest quiz score is worth 3% of your overall grade); they are designed to be diagnostic rather than punitive if you are struggling to understand the material. *Note: the quizzes will be available for “check out” from Canvas on the scheduled day. You will have a designated time limit to complete the quiz after you check it out. Make sure that you set aside a period of time to take the quiz on each of the two quiz days.*

Final Exam:

The final exam will be a comprehensive exam, potentially including questions related to any material covered throughout the quarter. As per the recommendation of the Harris administrators, the exam will be administered in-person to students enrolled in in-person sections of the course and administered remotely for students enrolled in remote sections. The format and content of the exam will be the same for both in-person and remote students. All students will need a laptop to take the exam. If you do not have a laptop and need to loan one from the school, please contact the head TA (mvinnakota@uchicago.edu) by October 8, 2021. We will provide more information on the final exam as it approaches.

Time Management & Time Expectations:

One of the most challenging adjustments for many students in their first quarter of graduate studies is time management. It is extremely important that you provide yourself ample time to complete all assignments and to prepare for all assessments.

Mini-assignments are designed to be completed generally in less than 20 minutes. As a reminder, mini-assignments are graded based on completion, so a student who makes a good-faith effort to correctly complete the assignment and submits it on time should receive full credit.

Homework assignments are worth the majority of your grade in the course, and, as a result, they will require a substantial amount of time. For many students, the homework assignments may take in excess of 10 hours to complete. With that time commitment in mind, it is extremely important that you start homework assignments sufficiently far in advance of the due date. Starting early ensures that you have ample time to complete the assignment and ample opportunity to seek help from your peers, TAs, instructors, and other course resources should you need assistance.

Other Course Policies, Information, and Resources

Emergencies or Assignment Conflicts, including Religious Exemptions:

In general, assignment dates are immutable out of fairness to your fellow students. That being said, we understand there are circumstances that may require accommodations, particularly amidst the ongoing pandemic. Please do *not* email your instructors regarding these requests. Instead, please direct requests to the Dean of Students & Director of Student Affairs, Kate Biddle (kbiddle@uchicago.edu). Dean Biddle will make a determination and at this point your instructor will work with you regarding an accommodation.

Communication & Weekly Newsletter:

Communication from instructors to students will happen primarily through the posting of materials on Canvas, including postings to Announcements and the Piazza discussion board. Each Sunday throughout the quarter, you will receive a weekly newsletter in the form of a Canvas Announcement. The newsletter will convey important information about all of the relevant items for the coming week. You should use this

newsletter as a reference for upcoming deadlines and planning for the week. Please note that *you are responsible for reading all Canvas Announcements related to the course*. To ensure receipt, you may wish to confirm that you have [email notifications](#) enabled for Canvas Announcements.

As there are many students in this sequence, emailing your instructor directly is the least effective way to have either a logistical or a pedagogical issue resolved. Therefore, we suggest and request that communication from students take the following forms:

Questions regarding scheduling and other course logistics should be directed to the head TA: Mythili Vinnakota, mvinnakota@uchicago.edu.

Questions regarding course material may be posted to the course Piazza page, a forum that is monitored by the teaching assistants and instructors. Please note that, while we strive to expeditiously respond to student questions posted on Piazza, you should *not* expect always to receive prompt replies, especially after normal business hours. So, please do not expect to receive a response at 9:00pm on Friday evening for a question related to the homework due later that night at 11:59pm.

Office Hours:

Each week, your instructors dedicate time for additional instruction through their office hours. You are encouraged to attend your instructor's office hours (rather than another instructor's office hours). However, if your schedule precludes you from attending your instructor's office hours, you may attend the office hours of another instructor. All three instructors will be holding scheduled office hours through Zoom. For these office hours, a student or small group of students (we encourage you to attend office hours in a small group!) can reserve an available time slot to meet with the instructor. More information, including time slots for scheduled office hours, is available on the course Canvas site.

In addition, the TAs will hold regularly scheduled office hours that you are encouraged to attend. These office hours are useful for asking questions about the course material, homework assignments, and troubleshooting R code. Additional information about TA office hours is also available on Canvas.

Re-Grading Policy:

A re-grade request must be submitted via email within 7 days after the assignment or exam is returned to you. To request a re-grade, you must complete a re-grade request form (available on Canvas), and email it to your instructor and the head TA. In all cases, *the entire assignment will be re-graded*, not just the question or specific part that pertains to your grievance. As a result, the re-grade can (and often does) result in a lower overall grade on the assignment or exam.

Statistical Software:

This course will require you to follow lectures and complete assignments using the statistical software R (and its companion software RStudio). From the outset of the course, we will be using R, so make sure it is fully working on your computer before the quarter begins. Fortunately, there is no charge for use of R, RStudio, or any of the R libraries that we will use in the course.

Coding Lab for Public Policy:

Coding Lab for Public Policy provides students with introductory coding instruction in R. Enrollment in this non-credit course is encouraged but not required. A Coding Self-Assessment was included with the Harris Orientation Modules to help students determine whether they would benefit from Coding Lab. Students are not required to submit the self-assessment for review; it is a tool to help students determine how much assistance they need to be successful in the Core. If you have questions about Coding Lab or the Coding Self-Assessment, reach out to your Academic Advisor.

Core Tutoring Program:

In addition to the Coding Lab, Harris offers 10 hours of free tutoring for students enrolled in core classes. Students can get assistance with understanding statistical concepts, reinforcing computational rules, and with coding in Stata or R. Harris Student Affairs will share information about how to access tutoring in Week 3 of the quarter. Any questions should be directed to HarrisStudentAffairs@uchicago.edu.

Ethical Academic Conduct:

All University of Chicago students are expected to uphold the highest standards of academic integrity and honesty. Among other things, this means that students shall not represent another's work as their own, use impermissible materials during exams, or otherwise gain an unfair academic advantage. All students suspected of academic dishonesty will be reported to the Harris Dean of Students for investigation and adjudication. The disciplinary process can result in sanctions up to and including suspension or expulsion from the University. In addition to disciplinary sanctions, the student will receive a grade of 0 on the exam or assignment in question and cannot earn higher than a B- in the course, regardless of their performance on other assignments and exams. At the instructors' discretion, the student may receive a failing grade for the course regardless of their performance on other elements of the course.

Please note that the collaboration policy is explicitly stated on every homework assignment. Not abiding by this policy is considered an ethical violation.

For additional resources on academic integrity at the Harris School and the University of Chicago, see:

- [University Student Manual](#)
- [Harris Student Handbook](#)
- [University of Chicago University Policies and Regulations on Academic Honesty & Plagiarism](#)

Recording & Deletion and Copyright & Course Content Policies:

The Recording and Deletion Policies for the current academic year can be found in the Student Manual under [Petitions, Audio & Video Recording on Campus](#):

- Do not record, share, or disseminate any course sessions, videos, transcripts, audio, or chats.
- Do not share links for the course to those not currently enrolled.
- Any Zoom cloud recordings will be deleted 90 days after the completion of the recording.

All course materials (including, but not limited to, class lectures and discussions, handouts, examinations, study guides and web materials) and the intellectual content of the course itself are protected by United States Federal Copyright Law. Students are permitted to make notes solely for their own private educational use. Students and all other persons are expressly forbidden from recording lectures or discussions and from distributing or selling lectures notes and all other course materials without the prior written permission of the instructors. Because the instructors own the copyright to the classroom presentations and all course materials, any notes taken during those presentations and subsequently sold or distributed to others would constitute an unauthorized derivative work and expose the person or persons involved to individual copyright infringement actions by the instructors.

Teaching and learning in in-person, dual-modality, and/or remote environments

This course is planned as an in-person experience, and students are expected to attend class at the Keller Center, with some exceptions as discussed below. Our practices and expectations include the following:

- We will use seating charts to facilitate any needed contact tracing. During the first two weeks of class, I will pass around a sign-in sheet during each class meeting. On the sign-in sheet, please write your name next to your seat number. Starting in week 3 you will need to sit in your assigned seat, which is the seat you last sat in at the end of week 2.
- Students must wear masks properly—covering both nose and mouth—at all times while in the classroom. Students who fail to comply will be reported to the Harris Dean of Students and [UCAIR](#), the University’s incident reporting system for COVID-19 safety matters.
- We ask that students not eat or drink during class.
- Please display your name tent every class so that I can more easily call on you by name.
- Because instructors, too, must comply with University teaching protocols, I will wear a face mask while in the classroom. If you cannot understand me even when I repeat or “try again” to speak, I will remove my mask temporarily to clarify, as long as I remain 6 feet away from the nearest person. *Please do not hesitate to ask me to repeat or restate anything that is unclear at any time.*

That said, of course, public health and/or personal health circumstances vary across individual members of the University community and may change abruptly with limited notice. Students, TA’s, and instructors may need to participate remotely for a short time or, in some limited instances, for the entire quarter. To guide expectations and plans, please note the following:

- **If you are experiencing COVID-19 symptoms or are required to isolate, do not come to class!**
 - As soon as possible, contact me or the TA by email if you cannot attend class for this reason. You should not send me medical information / doctors’ notes or the results of any COVID-19 test.
 - Students are expected to abide by the University’s [COVID-19 health requirements](#) AND its specific [Protocol for Addressing Confirmed or Suspected COVID-19 Exposures](#). Note that the Protocol, which addresses self-monitoring, testing, and isolating requirements, represents evolving guidance and is subject to change.
 - Any member of the University community who tests positive for COVID-19 should inform the University contact tracing team at C19HealthReport@uchicago.edu.
 - Students missing class for short spells during the term are encouraged to participate in class via live streaming, watch Zoom recordings of class sessions, and otherwise participate in class as fully as possible, health permitting.
- **A limited number of students may have permission to participate remotely for the entire quarter.**
 - The Harris Dean of Students Office makes these determinations and informs instructors of enrolled students with permission.
 - Enrolled students with remote status are encouraged to participate in class via live streaming, watch Zoom recordings of class sessions, and otherwise participate in

class as fully as possible, health permitting. We will use dual-modal instructional technology to facilitate class participation of students with remote status.

- **If I find that I cannot teach in person at some point during the term, I will communicate this as soon as possible to all the relevant stakeholders, including students!**
 - Health permitting, I will teach remotely via Zoom on such occasions.
 - Students can attend class in the Keller Center but would participate via Zoom on such days. Students can also attend remotely from home (or any other location that is devoid of distractions).
 - I will be in touch with the TA, HSIT, and ASA to make sure things work smoothly.